Locke Avenue Bridge and Bridge Tender's House

Swedesboro, New Jersey

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Locke Avenue Bridge and Bridge Tender's House

Swedesboro, New Jersey

prepared by
Kise Straw & Kolodner
Philadelphia, PA

for
Federal Highway Administration and
New Jersey Department of Transportation

1999

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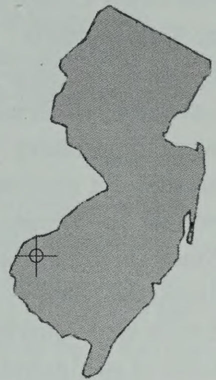
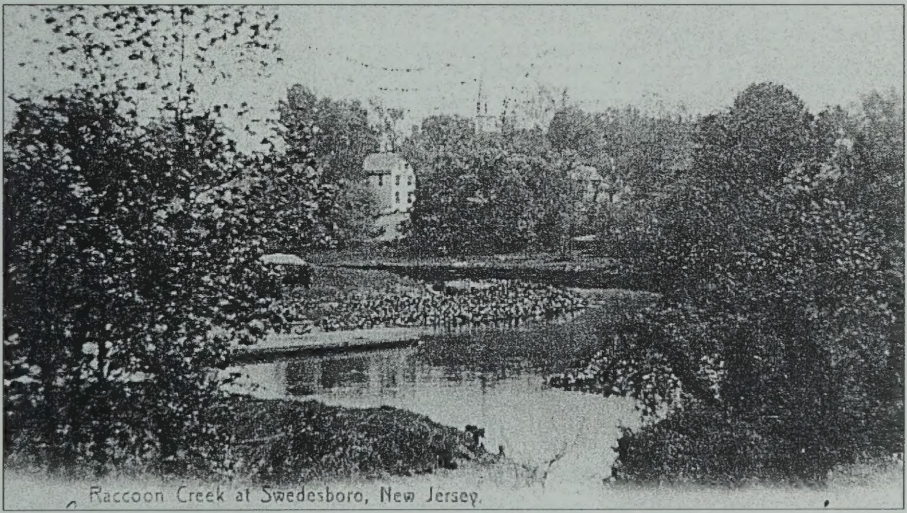
Historical Significance

The 1911 bridge carrying Locke Avenue over Raccoon Creek is the only swing span and the oldest of three movable span bridges surviving in Gloucester County. It replaced an earlier swing span bridge, constructed in 1887. The significance of the bridge is complemented by the fact that its adjoining circa 1890 bridge tender's house also survives. These resources have important associations with the history of commerce in Swedesboro and along Raccoon Creek.

Setting



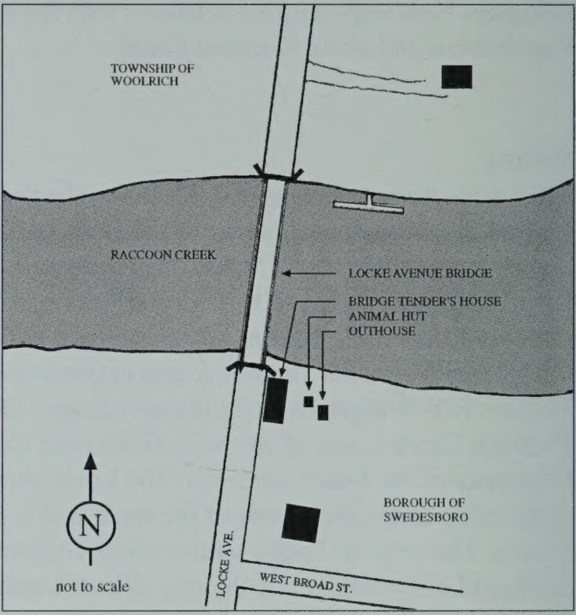
The Locke Avenue Bridge over Raccoon Creek is located in the northwest corner of the Borough of Swedesboro, Gloucester County, New Jersey. Locke Avenue (County Route 671) begins at Auburn Avenue (County Route 551) in Swedesboro, crosses Raccoon Creek into Woolwich Township, and extends north to Mullica Hill-Bridgeport Road (County Route 322). Raccoon Creek is one of the main Gloucester County tributaries of the Delaware River. The Locke Avenue Bridge is located eight miles above the mouth of the creek and is the fourth bridge upstream. The original bridge tender's house is located twelve feet from the south end of the bridge, on the east side of Locke Avenue. East of this



Circa 1906 postcard of Raccoon Creek at Swedesboro, New Jersey. (Courtesy of the Gloucester County Historical Society)

house are an outhouse and animal hutch. Development on the south side of the bridge includes a working-class neighborhood to the east and an abandoned industrial complex to the west. The vicinity north of the bridge is characterized by cultivated fields and rural development.

Commerce on Raccoon Creek and at Swedesboro



Site Plan. (Kise Straw & Kolodner, 1996)

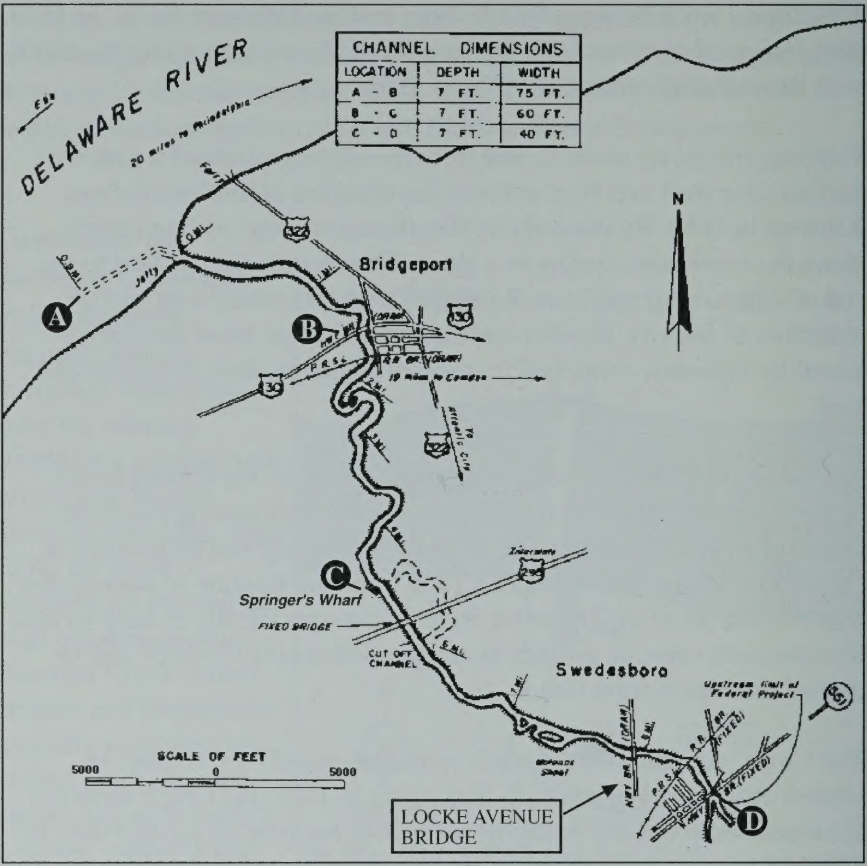
For early settlers, navigable waterways were the primary arteries for moving both people and freight. Since its founding, circa 1638, the town of Swedesboro marked the head of navigation on Raccoon Creek. Local farmers and lumbermen typically used wagons to haul produce and timber to Swedesboro's wharves, where it was loaded aboard sloops for shipment to towns downstream or the cities of Philadelphia and Wilmington. Items exported from Swedesboro during this period were commonly raw materials, such as freshly cut trees, and those shipped back to town were manufactured or milled, such as lumber and shingles ready for use in constructing buildings.

Throughout the first three-quarters of the nineteenth century, sloops and steamboats were the primary vessels found on the creek. In 1833 or 1834, John Burk purchased a small sloop, *Hornet,* and began carrying a variety of produce once or twice a week along the creek. Burk expanded his business in 1835 and purchased a larger boat, *Spy,* which carried passengers as well as freight. Transportation of produce and passengers along Raccoon Creek by steamboat began in 1845, when the Steamboat Company was organized and their boat *Independence* started making three trips a week between Swedesboro and the Delaware River. In 1849, after *Independence* was sold, the steamboat *Osceola* ran along the creek until the outbreak of the Civil War in 1861.

Shipping freight by water to and from Swedesboro entered a period of decline after the Civil War, with the introduction of the Swedesboro Railroad in 1869. By the early 1880s, the era of large sailing vessels along the creek was coming to a close. This change did not lead to the end of commercial traffic on Raccoon Creek, but rather a temporary reduction of activity. Smaller vessels, such as canal boats and barges towed by tugboats, continued to transport local produce, fertilizer, and coal.

Also in the early 1880s the Philadelphia District of the United States Army Corps of Engineers became involved in maintaining Raccoon Creek as a navigable waterway. This responsibility was established as part of the Philadelphia District's 1866 founding mission to manage the water resources of the Delaware River basin–specifically to keep navigation channels open, to provide an unimpeded supply of water, and to protect the region from floods.

The Corps' activities on the creek were authorized by Congress in various River and Harbor Acts. Beginning in 1882, the Corps surveyed the creek and proposed dredging projects to improve its navigability, but a lack of funding delayed these improvements for more than two decades. In 1899, the Corps re-examined and surveyed the creek and recommended improving it by dredging a channel that would remove 371,400 cubic yards of silt at a cost of over $102,000. According to the Corps' studies, commerce on Raccoon Creek expanded dramatically in the 1880s and 1890s, with the value of freight shipped on the waterway increasing from approximately $305,000 in 1882 to $1.3 million in 1899. As a result, Corps officials stated in a May 1899 report to Congress that "the improvement of the whole stream would largely increase the present commerce. The trucking interests are very large, and farmers depend principally on water transportation to obtain manure and other fertilizers and to get their crops cheaply to market."

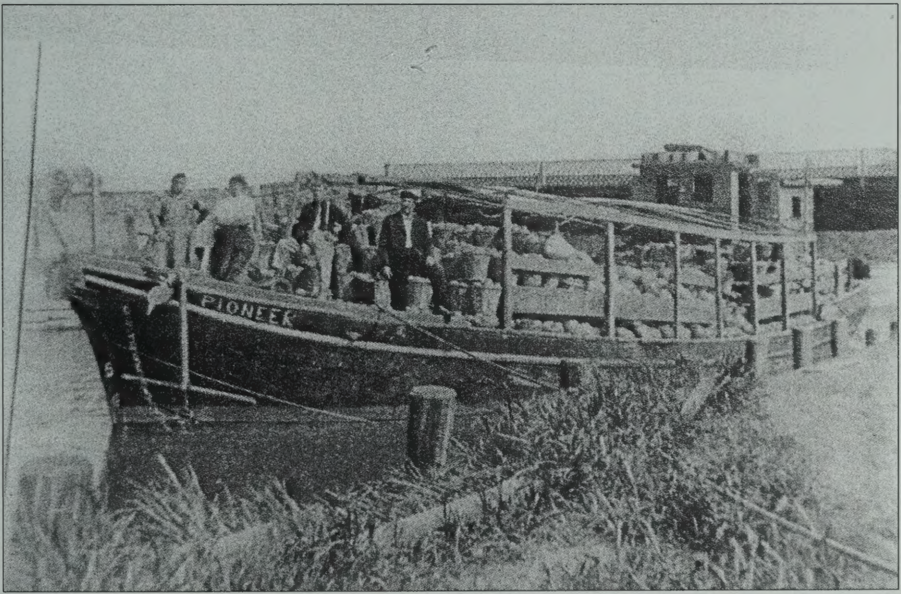


CHANNEL DIMENSIONS		
LOCATION	DEPTH	WIDTH
A - B	7 FT.	75 FT.
B - C	7 FT.	60 FT.
C - D	7 FT.	40 FT.

1969 map showing the navigable portion of Raccoon Creek. (United States Army Corps of Engineers, Philadelphia District)

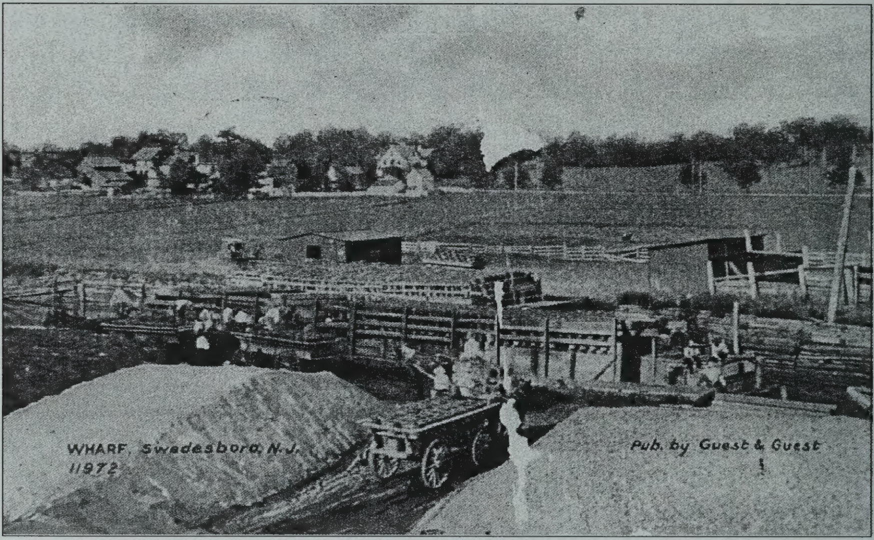
At the close of the nineteenth century the three main towns along the navigable portion of Raccoon Creek were Bridgeport (two miles upstream from the mouth), Springer's Wharf (five miles upstream), and Swedesboro (nine and three-quarter miles upstream), where a fixed highway bridge carrying Main Street (King's Highway) blocked water traffic and marked the head of navigation. The four bridges downstream from the fixed bridge all accommodated water traffic by allowing a high enough clearance or by opening to let boats pass. These bridges were, in order of their location moving downstream from the fixed bridge, the wood and iron Swedesboro Railroad bridge with a fixed span allowing a clear height of twenty-two feet above low water, the original 1887 bridge carrying Locke Avenue, a wood drawbridge for the Delaware River Railroad at Bridgeport, and an iron drawbridge for a country road, also at Bridgeport.

Although only four of the eighteen landings on the creek during this period were located at Swedesboro, the town exported forty-one percent and imported eighty-eight percent all freight transported along the waterway. Goods exported from Swedesboro at the end of the nineteenth century included produce and sand, with manure, coal, lumber, building materials, and hay comprising the principal imports. The majority of the 30,000 tons of produce, valued at $300,000, transported from Swedesboro by water was carried on four naphtha launches that made 720 round trips in 1899. Other types of vessels transporting freight to and from Swedesboro at this time included barges and canal boats towed by tugs (125 round trips), the steam barge *Willie* (145 round trips), and sailing vessels (50 round trips).



Early twentieth-century postcard of a boat loaded with produce on Raccoon Creek near Swedesboro, New Jersey. (Courtesy of the Gloucester County Historical Society)

In the first three decades of the twentieth century, commerce remained extremely active in Swedesboro and along Raccoon Creek. In 1902, the year Swedesboro was incorporated as a borough, Congress authorized dredging a canal in the creek from the Delaware River to Swedesboro– the same improvement project that the Corps first recommended in 1882. This work began in 1903. In 1907 Congress authorized a modification of the channel project to create a cutoff through the extremely sharp bends, known as Molonox Shoal, two miles below Swedesboro. Since the heaviest shipments were transferred at Swedesboro's wharves, in 1910 through 1912 the Corps suggested an additional modification of the channel project to extend the full seven-foot channel depth all the way to Swedesboro, instead of the planned decrease to five feet between Springer's Wharf and Swedesboro.

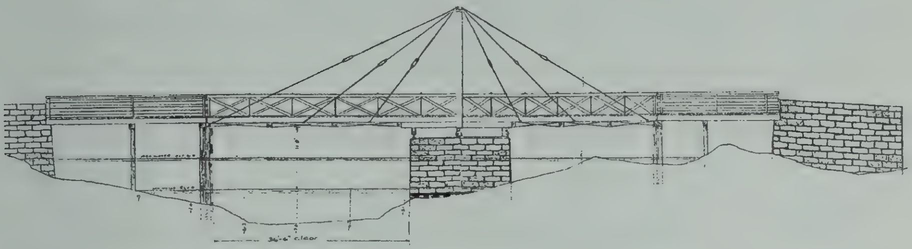


Circa 1908 postcard of a wharf at Swedesboro, New Jersey. (Courtesy of the Gloucester County Historical Society)

Construction of the present Locke Avenue Bridge between the summer of 1911 and the early months of 1912 coincided with the navigation improvements to Raccoon Creek and its bustling commerce. At this date, Raccoon Creek was one of the largest and most navigable of the Delaware River's lower tributaries. Considerable traffic passed down the creek to the river and on to Philadelphia. Much of this traffic passed through the Locke

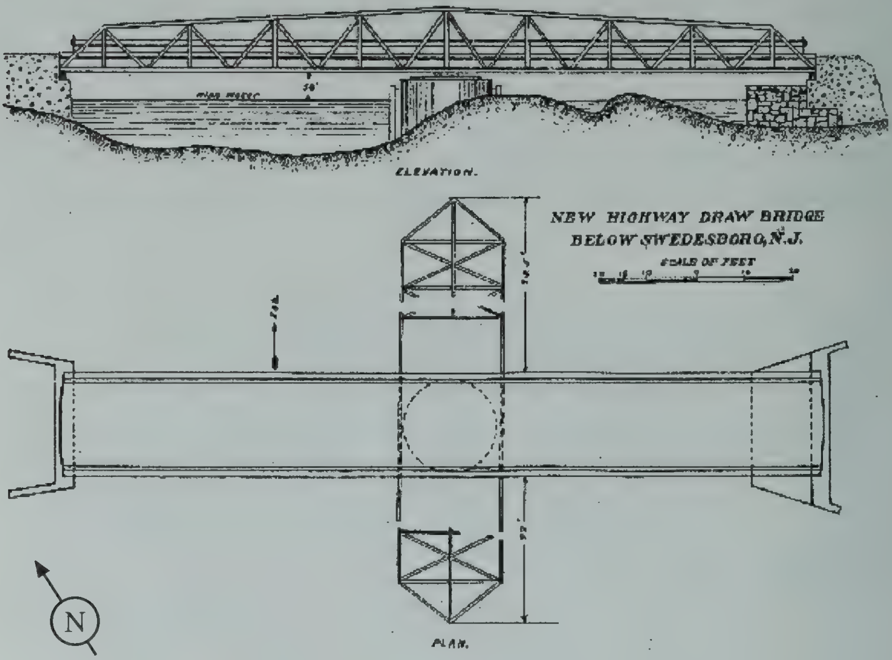
Avenue Bridge juncture, as the heaviest receipts and shipments on the creek were made at Swedesboro's wharves.

The 1911 bridge replaced the original 1887 cable-stayed truss, center-bearing swing bridge and nearly doubled the horizontal clearance from thirty-six and one half feet to sixty-four feet. Several reports prepared by the Corps between 1913 and 1914 reveal significant activity on the creek shortly after construction of the new bridge. The Corps continued to promote the project to extend the seven-foot channel upstream to Swedesboro, as proposed in 1910, and also mention constructing a jetty as a protective barrier at the mouth of the creek.



1911 drawing of the original 1887 bridge carrying Locke Avenue over Raccoon Creek. (Office of the Gloucester County Engineer)

In 1915, the Corps reported that the original dredging project was ninety-five percent complete and that bulky freight could be carried by water at half the cost of transporting it by rail. It was not until four years later, in 1919; however, that authorization was received for constructing the seven-foot depth extension to Swedesboro and the jetty at the creek's mouth. Finally, in 1922, the dredging projects on Raccoon Creek authorized by the Corps in 1902, 1907, and 1919 were finished. The completion of this project occurred in the same year that the north abutment of the Locke Avenue Bridge was rebuilt, and the bridge achieved its present configuration. In the following prosperous years of the early 1920s, Swedesboro was notable as one of the largest shipping centers for tomatoes in the country, and as one of the wealthiest communities in Gloucester County. Swedesboro was also established as a leading producer of sweet potatoes, asparagus, melons, peppers, and eggplants.



Details of the 1911 Locke Avenue Bridge from a 1914 map by the United States Army Corps of Engineers. (United States Army Corps of Engineers, Philadelphia District)

By the late 1950s, barges maneuvered by tugs still carried freight along Raccoon Creek, but the peak of commercial activity on the waterway had passed. Corresponding with this decline, in 1959 the County Engineer submitted a request to the Corps to discontinue full-time opening and closing of the Locke Avenue Bridge in the off-season months of December, January, and February. However, there was still enough activity on the creek to generate protests against this reduced operation, and the request was denied. In 1961, the County considered constructing a new fixed bridge in this location, and the County Engineer proposed that "the warehouse, being supplied by the lone vessel using this stream, be relocated downstream from the present bridge." This vessel was a fertilizer freighter operated by the Wright Brothers of Bridgeport, the only boat operators who remained involved in commercial hauling on Raccoon Creek. In 1965, when the Corps' scheduled maintenance program for Raccoon Creek ended, the creek was dredged for the last time. Consequently, with the lack of commercial traffic and dredging maintenance, the bridge was fixed in a closed position in 1971. Since that date, only recreational boats can be found on Raccoon Creek.

Movable Span Bridges

Swing bridges were the first type of bridge designed to have a movable span of substantial size. They were a popular type of bridge constructed over navigable waterways in the United States between the 1880s and 1920s. Swing bridges pivot on a horizontal axis to provide clearance over the waterway and allow vessels to pass by. The two types of swing spans are center-bearing, which pivots on a central pier, and rim-bearing, which pivots on roller bearings or wheels on a circular steel track. Some long bridges incorporate both types of pivot mechanisms. The earliest swing bridges were bumped open by the approaching vessel, but most were opened either by steam engines, gasoline or electrical motors, or manually by the bridge tenders.

The truss configuration on swing bridges is typically deeper over the central pier. One type of truss that became widely used in the United States in the early twentieth century is the Warren truss. This design, patented by Captain James Warren in 1848, is characterized by diagonal structural members. When the diagonal members exist in combination with vertical members, as on the Locke Avenue Bridge, it is called a Warren truss with verticals.

In 1994 over sixty-five movable span bridges constructed in the United States between 1896 and 1942 survived, with most located in the coastal regions of the Northeast. Twenty-one swing span bridges survive in New Jersey–three from the nineteenth century and nineteen from the twentieth century.

Description of the Bridge

The County Bridge Engineer, William C. Cattell, designed the present Locke Avenue Bridge in 1911. The Owego Bridge Company of Owego, New York won the construction contract in May 1911 with a proposed cost of $11,371. By early September, the project was well underway, and four months later, in the early weeks of 1912, it was completed.

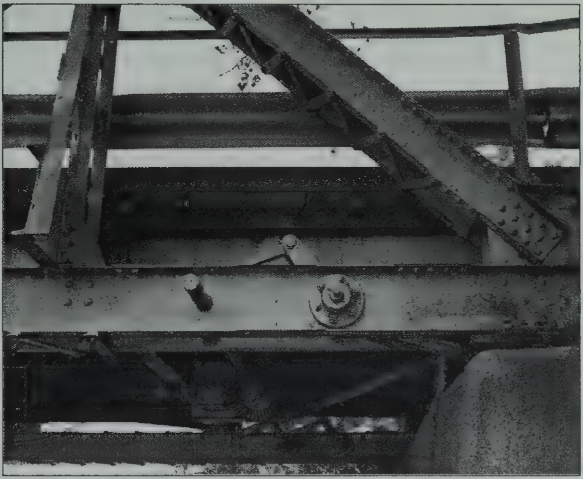
The Locke Avenue Bridge is a two-span, center-bearing, riveted steel Warren truss, swing highway bridge. Measuring approximately 154 feet in length and 15 feet in width, it carries one lane of traffic, even though it serves a two-lane road. The wood piling barriers, on the cross-axis of the bridge that protect it in the open position, extend seventy-three and a half feet downstream and seventy-seven feet upstream.

East elevation of center pier on 1911 bridge. (John Herr Photography, 1996)

The superstructure of the Locke Avenue Bridge consists of two Warren pony steel trusses, a wood deck, and a steel I-beam deck structure. The steel trusses are each constructed of nine riveted steel panels that increase in height from eight feet at the bridge ends to twelve feet in the center. The present deck is constructed of timber planks laid perpendicular to the bridge axis. The original drawings indicate that the deck was designed to be laid diagonally on a seventy-degree angle. Molded steel fenders extend along the length of the bridge. An older fender system, attached to round steel rails, is extant on the south approach, but the north approach has modern fenders that do not match any other elements on the bridge.

The substructure of the bridge is composed of reinforced concrete abutments and a central concrete pier. The south abutment is constructed on pilings. The central pier is encased in steel sheets and constructed of reinforced concrete on pilings. It is elliptical, with an approximately nineteen-foot diameter along the bridge axis. In 1911 the north abutment was constructed with a concrete section integrated into an existing stone abutment that is believed to have been part of the earlier bridge. In 1922 this abutment was replaced by a new reinforced concrete abutment.

The bridge was designed to be manually operated from the center of the deck by a large three-pronged key. One end of the key was inserted through a hole in the deck to connect to gears on the center pivot below. Bridge tenders moved the upper two arms of the key, like a capstan, to turn the gears. The center pivot is a conical roller type with a steel live



Locking mechanism at west side of south abutment on 1911 bridge. (John Herr Photography, 1996)

ring and cast steel stability rollers. In the open position, the bridge is supported entirely by the central pier. In the closed position, it rests on three pairs of cast steel rollers that sit on a ledge of each abutment. The bridge was manually locked and unlocked from the closed position by turning two steel wheels on each side of the trusses. Modern I-beams, bolted to the center pier and adjoining trusses, secure the bridge in its current, inoperable fixed position.

Other than the reconstruction of the north abutment and wing wall in 1922, alterations to the Locke Avenue Bridge have been minimal. Most of the work on the bridge has been maintenance-related projects such as wood deck replacement, fender repairs, and painting.

The chronology of alterations and repairs to the 1911 bridge includes:

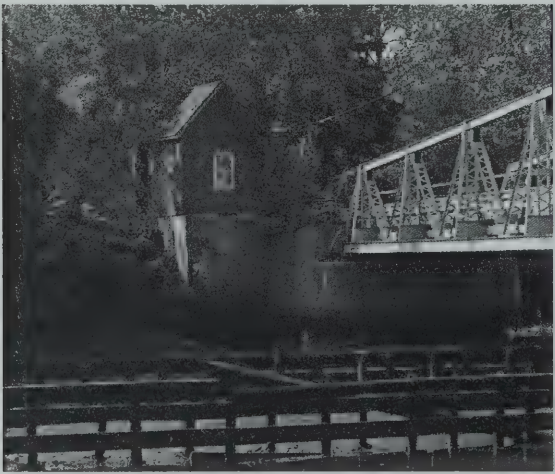
1922	Stone abutment on north end replaced with new concrete abutment and wing wall by Kolyn Construction
1929	New fender system by C. Fiske Campbell of Bridgeton, NJ
1942	Emergency deck replacement
1947	Entire bridge painted by Damask Brothers
1951	Deck replacement
1952	Painting of superstructure
1953	Fender repair
1959	Cleaning and painting iron structural work
1961	Swing span mechanism and fender repair and deck replacement with Southern Yellow pine
1963	Repairs and greasing
1971	Locked in fixed, inoperable position by I-beams bolted to center pier

1972	Deck and wood nailer replacement
1982	Painting of superstructure
1986	Deck replacement, repairs to concrete abutments and structural steel, and painting by Foundations & Structures, Inc. of Tuckahoe, NJ

Description of the Bridge Tender's House

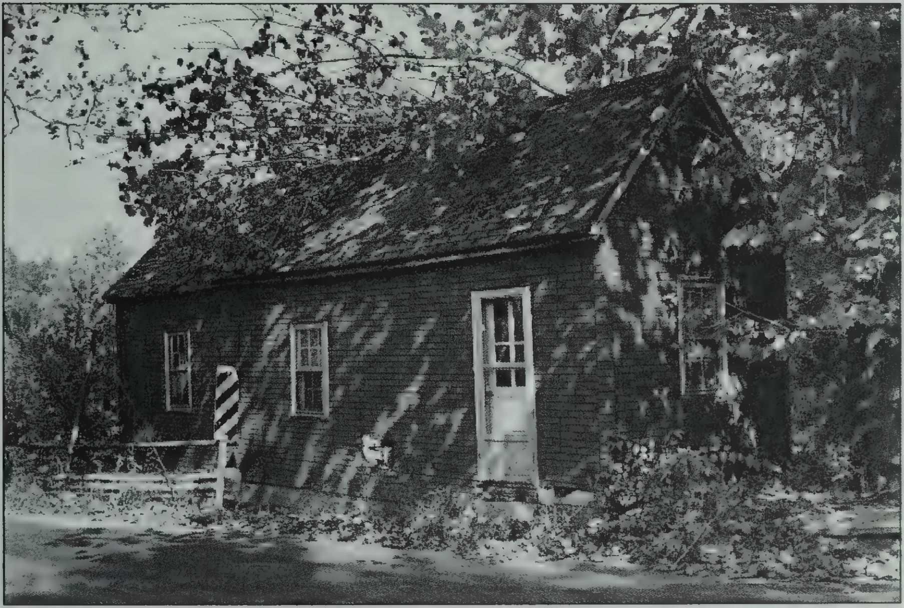
The Bridge Tender's House, built in conjunction with the first bridge circa 1890, provided shelter for operators of the movable span bridges at this crossing. Known bridge tenders include James Taylor (circa 1890-1908), William Passwater (1908-1922), Franklin Pierce Barber (1922-1932), Peter K. Leap (1932-1950), Charles Magin (1950-1963), and James Scott (1963-1981). All of these men lived in the house except Charles Magin, who already owned a residence north of the bridge.

The one-story, gable-roofed frame dwelling is rectangular in plan, measuring ten and one half feet wide and thirty-four feet long. The original section is twenty-two feet seven inches long and included the south two rooms. On 16 April 1908, Mr. and Mrs. Passwater received authorization from the borough to enlarge the house by one room. This addition lengthened the house to the north and added a partial basement. With the increased space, the Passwaters used the south room as a small store, where they sold candy and tobacco. The Passwaters served as bridge tenders when the first bridge was demolished and replaced by the present bridge in 1911.



View to southwest showing proximity of Bridge Tender's House to bridge and north elevation of house. (John Herr Photography, 1996)

The exterior is distinguished by an exposed concrete block foundation, asphalt siding that imitates red bricks and covers earlier clapboards, and a steeply-pitched gable roof with asphalt shingles. The east and west elevations are symmetrical, each with two windows and a door. The east doorway formerly had a shed roof doorhood. Both the north and south elevations have a central first-story window. Differences between these gable-ends are the exposed full-basement with a three-light casement window on the north elevation and a four-light casement attic window on the south elevation. All first-story windows have six-over-six double-hung sash and modern storm windows; except the north window where the sash has been removed. The sash in the three windows of the original house have molded muntins, while the muntins in the north addition have plain pointed profiles. The two exterior doors on the first story are identical and have four lights in the upper half, two horizontal panels in the lower half, and modern aluminum storm doors. All exterior trim is plain and unmolded.



West and south elevations of Bridge Tender's House. (John Herr Photography, 1996)

The interior of the house is divided into three rooms of similar size on the first floor and one room in the basement. There are no surviving interior doors. The south first floor room, which was last used as the kitchen, is finished with square linoleum tile flooring, a five-inch high unmolded baseboard, painted wallboard nailed to plaster walls, plain wood trim around windows and doorways, and a painted and papered ceiling. The only surviving fixtures are a large porcelain sink on the east wall just north of the doorway and a metal lighting fixture in the center of the ceiling.

The middle first floor room is more finely detailed than the other rooms. This simple ornamentation includes a wood baseboard with a rounded top edge, chamfered trim around the windows and south doorway, and a two-bulb central lighting fixture with an imprinted decorative pattern. The floor is covered with multiple layers of sheet linoleum of various patterns, including a floral motif on the bottom layer and a geometric design on the top. The walls and ceiling are finished with painted plaster on wood lath. In the former location of a heating stove in the southeast corner, there is a footprint for the stove hearth and a flue hole in the east wall. The only closet in the house is a shallow one with beaded-board walls that is located on the west wall of the middle room, between the window and the south partition. The doorway between the middle and north first floor rooms was originally an exterior doorway. It has a threshold covered with a pebble-patterned linoleum that extends into the north room, plain trim, and a multiple-light transom that is missing all of its glass panes and is covered on both side with wide vertical boards.

The north first floor room and basement below are part of the 1908 addition. The finishes in the north room include two layers of sheet linoleum flooring with floral patterns, a plain baseboard, and painted plaster walls and ceiling. The trim is plain on the east and west windows and the doorway to the middle room. The north window trim is chamfered and matches the window trim in the middle room, suggesting it was reused from another location on the original building. The basement has a dirt floor, an unpainted composition board ceiling, an exterior doorway with a battened door on the east wall, and a small opening in the south wall for access into the dirt-floored crawlspace under the original house.

The house is currently boarded closed and vacant. The exterior and interior finishes are in poor condition from water damage and neglect. Significant structural deterioration has occurred on the roof, where a large branch from the adjoining tree has fallen and damaged the sheathing, and at the west wall in the basement, where there are several stress cracks through the masonry.

Documenting the superstructure and deck of 1911 bridge. (Kise Straw & Kolodner, 1996)

The Recordation

In May 1993 the condition of the bridge was downgraded from poor to serious due to deterioration of the superstructure. Subsequent engineering studies determined that bridge replacement is necessary because of its limited five-ton load capacity, deterioration, and substandard design as a one-lane bridge on a two-lane highway. Plans are underway to demolish the present bridge and associated house and to construct a new fixed bridge.

Because of the historical significance of the Locke Avenue Bridge, the Federal Highway Administration and the New Jersey State Historic Preservation Officer established recordation requirements for the New Jersey Department of Transportation prior to allowing bridge replacement. This documentation included preparation of a Historic American Engineering Record report for the bridge and bridge tender's house in 1997 and this booklet in 1999.

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Glossary

abutment - the substructure supporting the end of a span, retaining or supporting the approach embankment.

battened door - a door constructed of vertical boards held together by horizontal boards (called battens) that are usually nailed to the interior side of the door.

bridge tender - a person responsible for opening, closing, and general operation of a bridge.

capstan - an apparatus used for moving or raising heavy weights that consists of a vertical drum that is rotated manually or mechanically.

chamfer - a beveled edge.

clapboard siding - a wood siding commonly used as an exterior covering on a building of frame construction; applied horizontally and overlapped, with the grain running lengthwise; thicker along the lower edge than along the upper.

clear height - the distance between a bridge and the water.

composition board - an inexpensive type of board, used in buildings, that is fabricated of wood fibers, under pressure at high temperature, usually with a binder.

deck - the floor of a bridge intended for vehicular and/or pedestrian use.

doorhood - a protective and sometimes decorative cover found over doorways.

fixed bridge - a bridge anchored in its location and not designed to rotate or open for traffic to pass by; a non-movable bridge.

gable roof - a sloping (ridged) roof that terminates at one or both ends in a triangular shape.

head of navigation - the furthest upstream point of a waterway that is traversable by vessels.

Historic American Engineering Record (HAER) - a method of documenting engineering and industrial sites that was established in 1969. This documentation program is directed by the National Park Service. HAER reports, drawings, and photographs are deposited in the Library of Congress in Washington, DC, where they are made available to the public.

I-beam - a structural member with a cross-sectional shape similar to the capital letter "I."

jetty - a structure extended into a sea, lake, or river to influence the current or tide or to protect a harbor.

landing - a place for discharging and taking on passengers and cargo.

movable bridge - a bridge that rotates or opens to allow traffic to pass by the crossing.

muntin - a framing member on a window that holds the glass panes.

naphtha launch - a common type of small boat used in the late nineteenth and early twentieth centuries that was powered by internal combustion engines that burned naphtha.

piling/pile - a long slender column usually of timber, steel, or reinforced concrete driven into the ground to carry a vertical load.

reinforced concrete - a type of concrete in which metal (as steel) is embedded so that the two materials act together in resisting forces.

sloop - a fore-and-aft rigged boat with one mast and a single headsail.

substructure - the abutments, piers, or other constructions built to support the span of a bridge superstructure.

superstructure - the entire portion of a bridge structure, located above the substructure, that primarily receives and supports traffic loads.

swing span bridge - a type of movable bridge that opens by rotating laterally to allow water traffic to pass.

truss - a structure composed of a combination of members, usually in a triangular arrangement to produce a rigid framework.

Warren truss - a major type of truss, patented in 1848, that has diagonals placed in either tension or compression and most easily recognized by its triangular outline.

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